

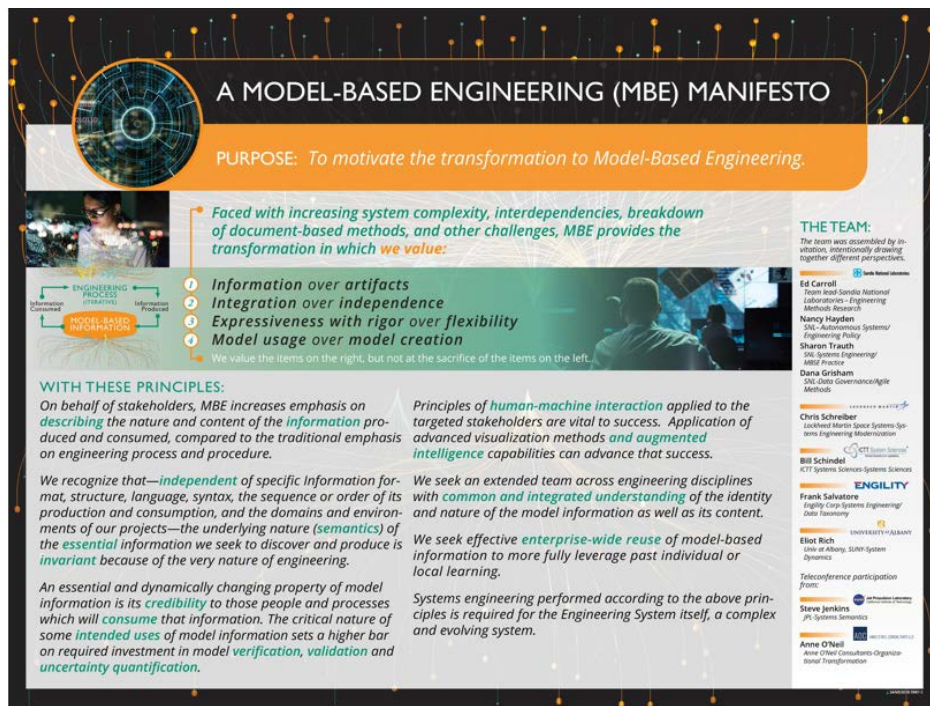
## INCOSE Enchantment Chapter Systems Engineering Challenge Event

August 8, 2018 – Nexus Brewery

SE challenges were submitted by Chapter members. The goal was to collaboratively discuss the nature of the challenge, and brainstorm suggestions to overcome issues while amplifying positive aspects. 4 challenges were submitted, and due to time constraints, 3 were discussed. 15 participants were involved in the event. Ann Hodges facilitated the discussion. The attendee list is at the end of the notes.

[For the record...Event planned to span 1.5 hours. First 30 minutes was networking over appetizers. Next 60 minutes devoted to 3 topics about 20 minutes each. Spilled over planned ending time with 15 or so minutes additional as momentum wore off gradually. This time allocation was effective and should be considered for future events.]

1. **Challenge 1 submitted by Ed Carroll:** The Model-Based Engineering Manifesto is the result of systems engineers, scientists, and researchers working group at the 19<sup>th</sup> IFSR Conversation (held in Linz, Austria). Challenge: Why/why not is the MBE Manifesto an appropriate guide for your modeling practice



**A MODEL-BASED ENGINEERING (MBE) MANIFESTO**

**PURPOSE:** *To motivate the transformation to Model-Based Engineering.*

*Faced with increasing system complexity, interdependencies, breakdown of document-based methods, and other challenges, MBE provides the transformation in which we value:*

- 1 Information over artifacts
- 2 Integration over independence
- 3 Expressiveness with rigor over flexibility
- 4 Model usage over model creation

*We value the items on the right, but not at the sacrifice of the items on the left.*

**WITH THESE PRINCIPLES:**

*On behalf of stakeholders, MBE increases emphasis on describing the nature and content of the information produced and consumed, compared to the traditional emphasis on engineering process and procedure.*

*We recognize that—independent of specific information format, structure, language, syntax, the sequence or order of its production and consumption, and the domains and environments of our projects—the underlying nature (semantics) of the essential information we seek to discover and produce is invariant because of the very nature of engineering.*

*An essential and dynamically changing property of model information is its **credibility** to those people and processes which will consume that information. The critical nature of some intended uses of model information sets a higher bar on required investment in model verification, validation and uncertainty quantification.*

*Principles of human-machine interaction applied to the targeted stakeholders are vital to success. Application of advanced visualization methods and augmented intelligence capabilities can advance that success.*

*We seek an extended team across engineering disciplines with common and integrated understanding of the identity and nature of the model information as well as its content.*

*We seek effective enterprise-wide reuse of model-based information to more fully leverage past individual or local learning.*

*Systems engineering performed according to the above principles is required for the Engineering System itself, a complex and evolving system.*

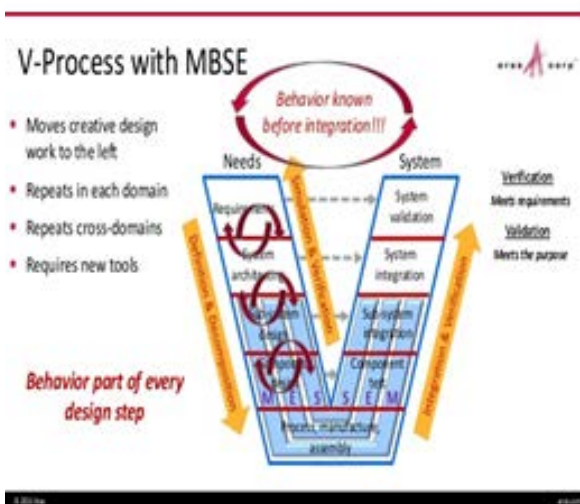
**THE TEAM:**  
*The team was assembled by invitation, intentionally drawing together different perspectives.*

- Ed Carroll: Team Lead, Sandia National Laboratories - Engineering Methods Research
- Nancy Hayden: SRI - Autonomic Systems/Engineering Policy
- Sharon Truitt: SRI, Systems Engineering/MBE Practice
- Dana Grisham: SRI, Data Governance/Agile Methods
- Chris Schreiber: Lockheed Martin Space Systems, Systems Engineering Modernization
- Bill Schindler: CTI System Science/CTI Systems Science-Systems Science
- Frank Salvatore: Engility Corp/Systems Engineering/Data Facilitation
- Eliot Rich: Univ of Albany, SUNY-System Dynamics
- Steve Jenkins: JPL-Systems Simulation
- Anne O'Neil: Anne O'Neil Consultants/Organizational Transformation

- Purpose of the manifesto: generate a conversation leading to transformation to a model-based environment; model-based engineering environment for engineers.
- Discussion on “value over R.”

- If a machine can interpret, is there value? Rigor – interpreted the same way across scopes.
- STEP, AP233.
- Has MBE got problems to be saved from? SE needs to be “liberated” – there’s artifacts galore.
- Support for high consequence, e.g., FAA certification.
- Who is the “user” of a model?
- Content over container.
- What’s the revolution that we want?

2. **Challenge 2 submitted by Eva Wallace:** product Lifecycle Management (PLM) and Model-Based SE (MBSE) – Can PLM and MBSE be connected and coexist to support mission success? What is the relationship between them? How can both be integrated into an organizational strategy to solve development challenges?



- PLM is a hub, most MBSE assumes there’s a hub.
- OMB MBSE wiki.
- TOG.
- PLM repository for existing models, e.g., already qualified and V&Vd with respect to limitations/context.
- Consider information for decisions, e.g., costs throughout the lifecycle.
- Product line owned by marketing (have “head” knowledge @ Honeywell), SE not involved.
- Models can support knowledge transfer, know where your knowledge base is. Culture issue. Capture and disseminate knowledge and manage info.



- Scope of system, sharing knowledge of players.
- Model integration.
- Constraints drive characteristics.
- Different languages – product line vs. MBSE.

3. **Challenge 3 submitted by Rick Dove:** Overcoming the male leadership culture – reorienting male leadership and organizational culture to value, hire, and promote women as leaders in SE. Some problem reality:

- i) Unconscious, primate/human behavior patterns favor male leadership dominance
- ii) Emotionally men feel their assumed position of privilege is threatened
- iii) Effective behavior-changing occurs for emotional reasons, not rational reasons
- iv) What is the personal bigger threat or compelling reward that overcomes the threat?
- What does empowering mean? Locked into system. Any kind of bias, assumption of privilege
- Fighting patterns
- Alpha male concept rampant
- Culture we typically work in is hierarchical “mil std” world
- Power (male) vs. community (female) focused
- How to change value structure given the current value structure?
- How to overcome
  - i) Find a bigger “threat” or bigger “reward”
  - ii) Tell a story – has to be personal – crossing a boundary. Forces people to confront their perceptions and biases.
  - iii) Privileges allow a group to function
  - iv) Take a moment – not instinct and make a decision
  - v) Psycho-cybernetics book – “How to Break a Habit”
  - vi) Need horizontal to vertical “epiphany”
  - vii) We remember a story – connect emotionally

4. **Challenge 4 submitted by Rick Dove:** Security accepted as an SE functional requirement. *Didn’t discuss due to time constraints.* Some problem reality:

- i) Systems engineering consider system security to be a black art beyond their depth of SE functional attention and understanding
- ii) Contract success for systems security is satisfied by compliance with specified required standards

What are compelling value propositions for overcoming SE and contracting impediments?

Participants:

Ed Carroll	Marcus Johnson
Mary Compton	Ron Lyells
Rick Dove	Paul McGoey



Celeste Drewien	Sebastian Quimbay
Gary Froehlich	Laura Salguero
Regina Griego	Jamie Thorpe
Ann Hodges	Eva Wallace
Jason Jarosz	